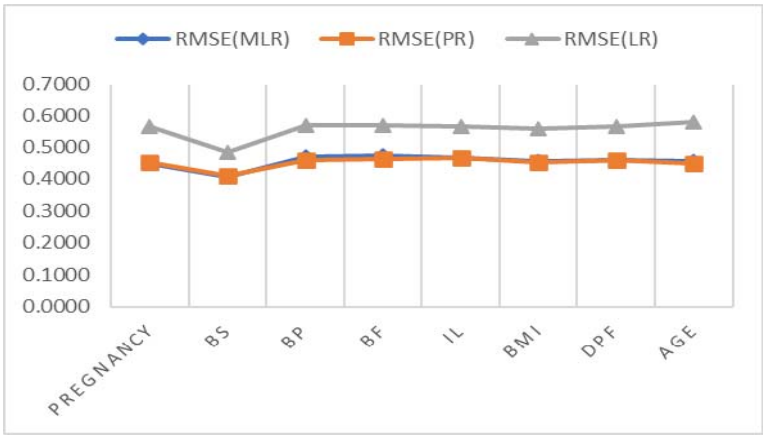
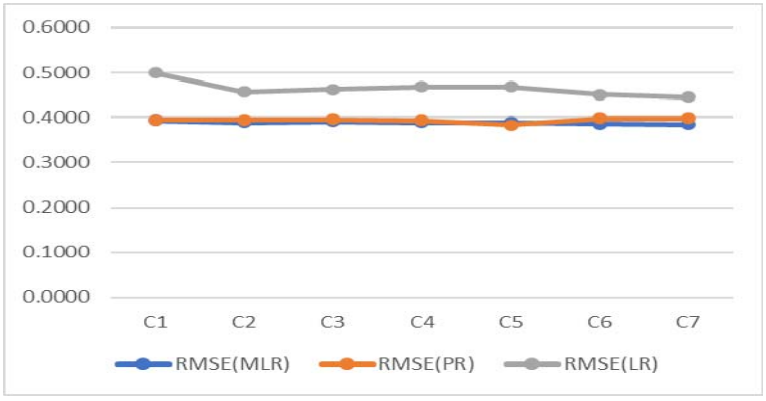


a) RMSE of PMS



b) RMSE of CPMS

Fig. 6. a) RMSE of PMS b) RMSE of CPMS

Accuracy of models is identified for each parameter as shown in Fig. 7. The entire PMS are computed for MLR, PR and LR models. R2 Score [37] identifies the accuracy of the models which is given in equation (4). Seeing the result, it is revealed that the best parameters for identifying the diabetes in an ordered arrangement are BS, Pregnancy, BMI, Age, DPF, BF, IL and BP.

$$R^2=1- \text{ RSS/TSS} \qquad (4)$$

where, RSS is Sum of squared residuals and TSS is Total sum of squares.

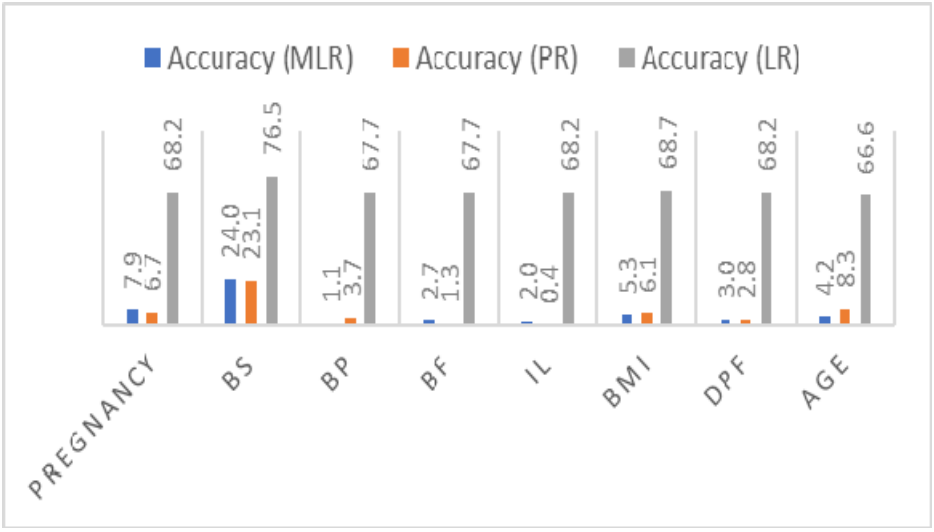


Fig. 7. Accuracy of PMS

A comparative analysis of MLR, PR and LR for each parameter in PMS is shown in Table 4. A significant percentage increase of accuracy is identified when Logistic Regression is used instead of Multiple Linear Regression and Polynomial Regression. The discrete nature of Logistic Regression is making a significant contribution in the enhancement of accuracy.

Table 4. Comparative Analysis of MLR, PR and LR for individual parameters

PMS	Accuracy (MLR)	Accuracy (PR)	Accuracy (LR)	Diff.(LR-MLR)	Diff.(LR-PR)	%Inc wrt MLR
Pregnancy	7.9	6.7	68.2	60.3	61.5	763.5
BS	24.0	23.1	76.5	52.5	53.4	218.8
BP	1.1	3.7	67.7	66.6	64.0	6054.5
BF	2.7	1.3	67.7	65.0	66.4	2407.4
IL	2.0	0.4	68.2	66.2	67.8	3310.0
BMI	5.3	6.1	68.7	63.4	62.6	1196.2
DPF	3.0	2.8	68.2	65.2	65.4	2173.3
Age	4.2	8.3	66.6	62.4	58.3	1485.7

Accuracy of the model is identified w.r.t. the ordered arrangement of parameters in Fig. 8. The parameters are combined together stepwise, so as to see if the accuracy of the model is enhanced or not. The entire CPMS are computed for the MLR, PR and Logistic Regression. R2 score is used to identify the accuracy of the model. Seeing the result, it is revealed that on uniting the parameters the accuracy is enhanced.

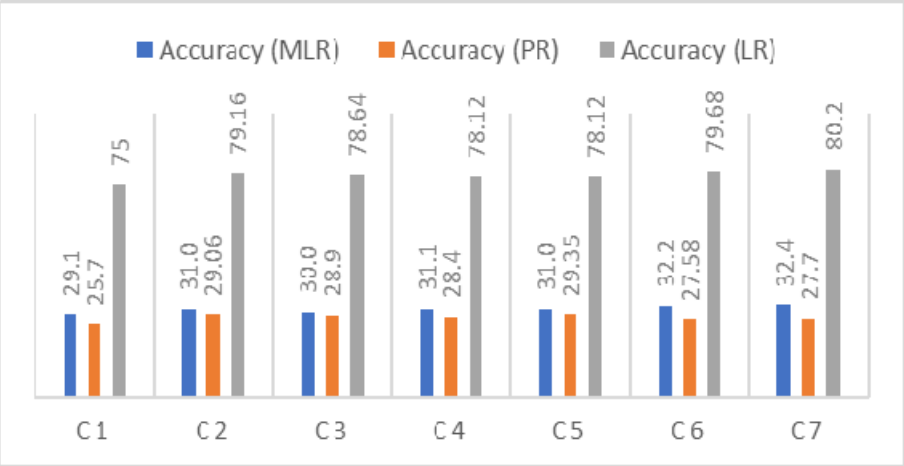


Fig. 8. Accuracy of CPMS for ordered combination of parameters

A comparative analysis of MLR, PR and LR for ordered combination of parameters in CPMS is shown in Table 5. A significant percentage increase of accuracy is identified when Logistic Regression is used instead of Multiple Linear Regression and Polynomial Regression.

Table 5. Comparative Analysis of MLR, PR and LR for ordered CPMS

CPMS	Accuracy (MLR)	Accuracy (PR)	Accuracy (LR)	Diff.(LR-MLR)	Diff.(LR-PR)	%Inc wrt MLR
C1	29.1	25.7	75	45.89	49.3	157.6
C2	31.0	29.06	79.16	48.13	50.1	155.1
C3	30.0	28.9	78.64	48.69	49.74	162.6
C4	31.1	28.4	78.12	47.06	49.72	151.5
C5	31.0	29.35	78.12	47.15	48.77	152.2
C6	32.2	27.58	79.68	47.48	52.1	147.5
C7	32.4	27.7	80.2	47.81	52.5	147.6

5. Conclusion

Diabetes stands as one of the most pervasive ailments afflicting people across the globe. This complex condition manifests through a range of parameters, often entailing severe and even life-threatening health implications. Swift identification of these parameters at an early stage holds the potential to preclude the emergence of severe health issues, offering substantial benefits to individuals. The current research is dedicated to a comprehensive parametric analysis of Patient Medical Statistics (PMS) and Combination of Patients Medical Statistics (CPMS) through the lens of linear, multi-linear, polynomial, and logistic regression models. The efficacy of these models is assessed using RMSE and R2 metrics, unveiling the logistic regression model's superior accuracy, attributed to its inherently discrete nature. Additionally, the study reveals that orchestrating CPMS in a systematic sequence according to their impact on diabetes detection yields heightened accuracy rates. Looking ahead, the study's implications suggest avenues for future exploration, such as broadening the scope of analyzed parameters for disease detection enhancement

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Conflict of Interest: The author has no conflicts of interest to declare.

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